Haliburton Energy Services Inc.
Westport Technology Center International
6700 Portwest Drive
Houston, TX 77024
Point of Contact: Dan Gleitman
Tel.: (713) 479-8400; Fax: (713) 864-9357
Email: dan.gleitman@westport1.com

Petrophysical Characterization and Reservoir Simulator for Methane Gas Production from Gulf Of Mexico Hydrates

ABSTRACT

Gas hydrate offers a huge source of energy, a potentially economic method for transporting natural gas, a method for deep-ocean sequestration of green house gases and novel gas separation processes. The stability and kinetics of gas hydrates are well understood in the absence of associated sediments. However, there is a dearth of necessary kinetic and transport data for gas hydrate formation and dissociation in sediments. The proven mechanisms are still unavailable to explain several interesting phenomena that have been observed near gas hydrate conditions in cores in subsea conditions. Much remains to be understood about the effect of sediments on the wellbore stability and kinetics of gas hydrates and for the safe and economic production of gas from the gas hydrate resources. Currently available models for these applications are inadequate due to the lack of sufficient data and lack of proven mechanisms for hydrate formation and dissociation in particular in sediments under deep water conditions in the Gulf of Mexico.

Under this program, Westport Technology Center International will create new knowledge on the above phenomena, through laboratory experiments and analytic modeling. Westport will port this new knowledge into focused laboratory services, and software tools, for use by operators in their prospect evaluation, well planning, and life-of-field management processes.

There are four major task groupings in this program. We will identify and measure petrophysical properties needed to characterize methane production from a hydrate reservoir, typical of Gulf of Mexico; quantify the effect of sediments on these petrophysical properties; develop a reservoir simulation model to integrate petrophysical data to estimate reserves and to assess well productivity; and develop a hydrate reservoir simulator by integrating the reservoir simulation model and the geophysical properties models developed in this project with our inhouse model of gas hydrate control for deep water drilling operations (SWIFT).

The proposed work program will utilize unique capabilities of Westport Technology Center including CT scanning, PVT, hydrates, flow assurance, reservoir engineering, geology, rock mechanics, and analytical services. Furthermore, properties of

the hydrate/sediment systems will be monitored while hydrates are formed and also dissociated. Included will be temperature, pressure, volume, acoustic, electrical and mechanical properties. The CT scanning will be utilized to observe the formation and dissociation of hydrates in different types of sediments under various temperature and pressure environment.

The program will result in new services and tools for industry, providing appropriate methods and protocols to form and analyze natural gas hydrate cores. New model elements specific to gas hydrate bearing or favorable reservoirs will result, for subsequent incorporation into existing petrophysical, drilling practices, well bore stability, and reservoir models and associated software tools. A database of hydrate-in-formation characteristics will result, for input into existing full field simulators, enabling simulation of reservoir production and lifetime characteristics.